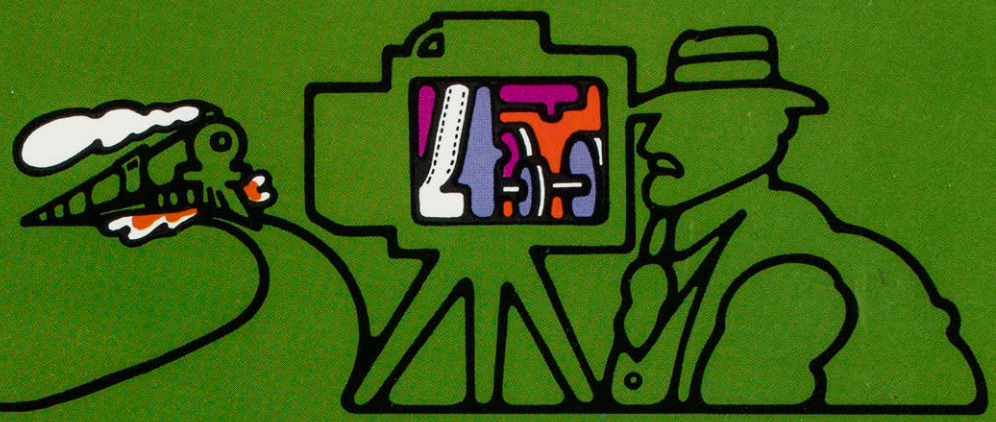
MUSEUM ALLIANCE

QUARTERLY

LOS ANGELES COUNTY MUSEUM OF NATURAL HISTORY
VOL. 8 NO. 2
FALL ISSUE 1969

The Wizard of the West

page 12



Tranquilizers and Sedatives from Plants

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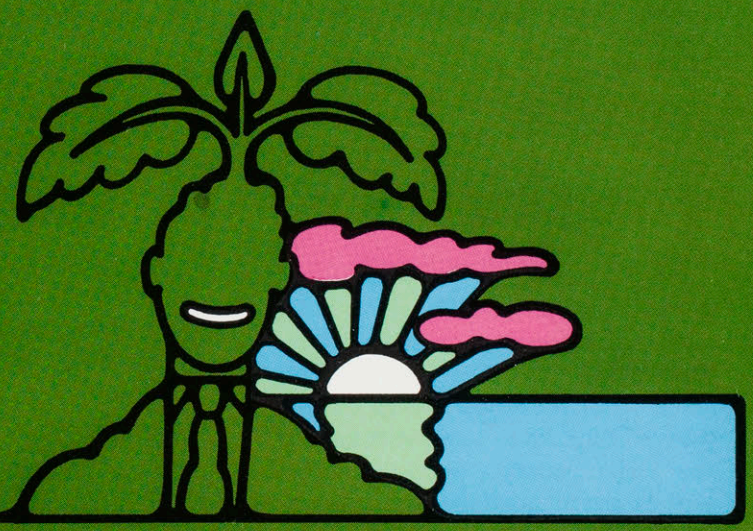

Koto, Shakuhachi and Shamisen: a Brief History of Japanese Music

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There is something in it for everyone! You are invited to become a member of the Los Angeles County Museum Alliance, to participate in its programs, to receive its publications, and announcements.

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Did you solve all your Christmas giving problems? What about those year-round occasions — birthdays, anniversaries, thank yous? A membership in the Museum Alliance can be a universal solution. The Alliance offers a warehouse full of exciting and different programs throughout the year.

Where else would you be likely to find someone to arrange a whale hunt for you and your family? Or a tour that leads you through the Mother Lode country of California? Have **you** ever thought to travel along a major geologic fault system to look at sag ponds, offset drainage and crush zones?

For those who find hunting whales and peering into faults a bit too frightening, the Alliance offers a complete and diversified program designed for children, discounts in the Museum bookstore, special preview of new exhibits and the handsome **Quarterly.**

Where else can you find a gift that can please so many different tastes?

Alliance Reception

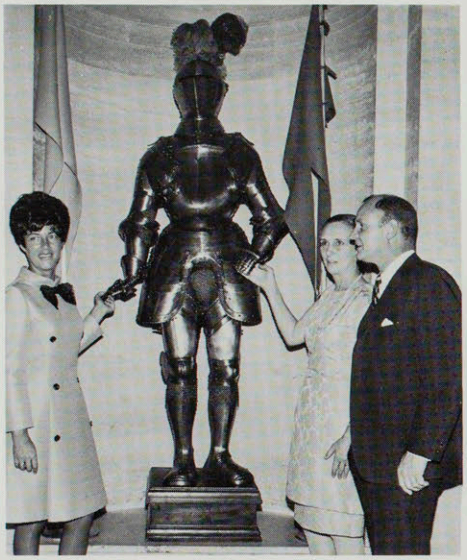
Perhaps never before has man been so overwhelmed by the present and the future. We are caught up in a space age which leaves us bedazzled with its prospects, and a generation gap leaves us speechless.

The virtue of perspective has never seemed so valuable.

How better to gain perspective than to have a curator momentarily take you back to the Middle Ages to see the beauty of its heraldry and the coldness of its steel as part of man's unfolding story? And how timely are the observations of a man who has lived with an ancient people who, virtually untouched by modern civilization, seek their god and find artistic inspiration in hallucinogenic peyote?

Thoughtfully planned receptions bring members closer to the experts who conceive and develop new exhibits and shows. The resulting exchange is an advantage that only Alliance membership can bring. And it's just one advantage of your membership. Why not ask a friend to share the involvement of Alliance membership?

Lessons of the past and present are doubly useful if they can be learned in the informal setting of one of the preview receptions offered by the Alliance to its members. Pictured on this page are some of the more recent Alliance activities.



An Exhibition of America's Black Heritage

The History Division, assisted by the Museum's Black Culture Committee, has organized an exhibition of black history and culture which will run from December 3, 1969, to mid-February, 1970. Focusing on the black man in Los Angeles, William Mason, Associate Curator of Archives, has compiled a sampling of local materials from the Museum's collections and from the community. Adding historical perspective is the depiction of the national scene, from 1619 to the present, assembled by Burton Reiner, Assistant Curator of American History. This section includes valuable paintings by American artists and many rare documents and artifacts.

Running concurrently with the exhibition will be a series of relevant varied programs in the Museum auditorium. These were scheduled by the Education and History Divisions with the cooperation of the Black Culture Committee. Two specially constructed units in the exhibition hall will house audio-visual dramatic displays in a multi-media approach.

This major exhibition is the first of its scope and depth on the West Coast. It is appropriate that it take place in Los Angeles, which numbered among its original settlers a number of black people. Several paintings, depicting the founding of Los Angeles, show these black pioneers.

Russell Belous, History Division, and Mrs. Medgar Evers discuss Black Heritage exhibit prior to opening.

It is the plan of the History Division to continue its studies, by means of relevant exhibitions, into the past of the several ethnic minorities who live in Southern California. Thus far, it has produced well-received exhibitions on Mexican, Japanese, Chinese, and now, Black American history. It is the Museum's strong belief that in striving to meet the cultural needs of the entire community, it is meeting the challenge of our nation's motto: **e pluribus unum.**

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MUSEUM ALLIANCE

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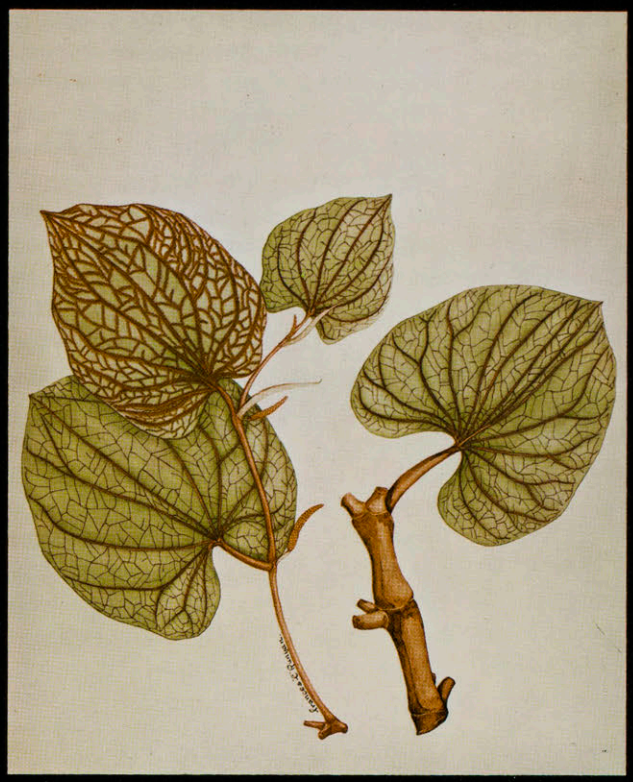
Tranquilizers and Sedatives from Plants

"Give me to drink mandragora—
That I might sleep out this great gap of time,"
Anthony and Cleopatra, Act I, Scene V

Dr. William A. Emboden Jr.
Research Associate in Botany
Los Angeles County Museum of Natural History; Professor of Biology,
San Fernando Valley State College

Pascal is reported to have said that the greatest ailment of man is his inability to sit quietly in his chamber; in the stems, roots, leaves and flowers of herbs, man has sought and found solutions to his historical "dis-ease." It is estimated that over four billion sedative and tranquilizing pills are consumed in the United States every year. While many of these are derived from laboratory syntheses, other cultures have for centuries used comparable drugs from the plant world. **Hypnotica** is the term used to describe drugs which we commonly refer to as sedatives. However, this category of narcotics must now be expanded to include those chemicals that tranquilize without inducing sleep or drowsiness. Man does not always seek states of euphoria; he may, in Freudian terms, wish only to rid himself of a state of neurotic despair and take on the common misery of mankind.

Throughout many of the Pacific Islands, which figure so prominently in our romantic literature, there is cultivated a shrub which produces a slightly bitter, somewhat soapy, aromatic resin capable of inducing states of tranquility and sleep. **Piper methysticum** is the binomial by which the botanist characterizes the plant which is closely related to the black pepper plant of commerce (**Piper nigrum**). Children are responsible for producing the beverage, kava, (Kavakava, keu, ava) by chewing the roots and lower stem of the plant and spitting the material into a large wooden bowl. Not only does the addition of alkaline saliva promote the extraction of kavine (an unidentified structure), but according to the natives the resultant beverage is tastier than the mechanically grated bark. Hygenic considerations have led the French and English to prohibit such chewing. The saliva-bark mixture is diluted by the addition of water and the mixture is strained into coconut bowls. One half of a coconut bowl of the astringent brew is enough to induce a state of well-being which may terminate in a somnolence of several hours if the consumption is excessive. Contentment brings about no cessation of reason. It is interesting to note that states of anxiety



Kava-kava *(Piper methysticum)* of the Pacific Islands.

Snakeroot *(Rauvolfia serpentina)* was an early Indian tranquilizer.

Colombia's tree *Datura (Methysticodendron amnesianum).*

and restlessness have been recorded as reactions to large amounts of the resinous beverage. Such observations suggest that the exudate includes a more complex pattern of alkaloids which might include some analeptics.

In ancient China, herbalists often prescribed "cat powder" for colic. Hot sake (rice wine) with "cat powder" was not only a popular sedative, but something of an europhoriant in its initial state of action. Since this time it has been most frequently used to pacify large cats, such as lions and tigers in oriental zoos. The twigs and leaves of **Actinidia polygama** are the source of the active principles—actinidine and matatabilacetone. The former is a sedative which depresses the limbic system and the latter is structurally related to an oil found in **Nepeta cataria** — catnip!

In the lore of witchcraft there is one plant that makes repeated appearances, it is the deadly nightshade (**Atropa belladonna**). A native of Europe, this plant is found illustrated in all of the great herbals of the 16th century. Not only was it reputed to have magical powers, but it was quickly recognized as a useful cosmetic, as the specific epithet implies (**belladonna**) beautiful woman. Decoctions of this herb dropped into the eye result in dilation of the pupil, giving the eye that doe-like quality that men have historically found irresistible.

An unassuming perennial herb, **Atropa** grows but a few feet tall and has small bell-like flowers of a purple color and later produces a black berry. All parts of the plant contain alkaloids to some degree, but the leaves harvested at flowering (May to June) contain the greatest concentration of narcotics. After several weeks of drying, leaves are subjected to organic solvents and alkaloids are crystallized out. In ancient times, leaves were burned and the vapors inhaled or a simple aqueous preparation was consumed. Ten important alkaloids are derived from **Atropa,** among these are some with stimulant properties and others with sedative powers. Atropine, one of the ten, is an important stimulant of the central nervous system while scopolamine, another of the ten, depresses the parasympathetic centers to produce "twilight sleep," a frequent obstetrical practice. It is no wonder that in primitive cultures the physical state resulting from consumption of **Atropa** is characterized as a "troubled sleep." Hyoscyamine and belladonna relieve pain, counteract muscle spasms, and dilate the eye. Given this array of properties, it is understandable that it has been associated with witchcraft and magical rites.

Aboriginal tribes living in the Americas had two centers from which they obtained an herb or tree **Datura,** which was used in magico-religious rites or divinatory seances. Southwestern United States and adjacent Mexico, and the Andes from Colombia to Chile and along the adjacent coasts are areas in which several narcotic containing members of the genus are to be found. Although the morphology varies from herbs with flaring white trumpet-like flowers to trees with sinister appearing orange-red tubes, almost all members share a common pool of potent alkaloids. Richard Evans Shultes, the distinguished ethnobotanist of Harvard University who has done much research on this genus, reports that **Datura** rituals are being reintroduced into civilized Andean tribes.

Six species of **Datura** are of economic importance in the preparation of commercial drugs. Leaves are crushed and incorporated into native beverages. Due to the presence of a variety of alkaloids, an initial violent fit may be experienced, followed by a fitful sleep which is accompanied by visual hallucinations, which, in primitive cultures, are taken to be divinatory; hence it is often the witch doctor who drinks the seed or leaf infusion in order to prophesy. Incorrigible children may also be given the seed with the hope that an ancestor will visit the child in his tortured dreams to admonish him. It is no wonder that one of the common names for **Datura** is "Devil's trumpet."

Only a few years ago, it was reported that California schoolchildren were boiling the flowers of **Datura stramonium** to produce a brew with a kick; the price of such an adventure can be exorbitant in that a concentrated solution can lead to death. The drug stramonium is referred to in common parlance as "knockout drops." Prominent among the other constituents are scopolamine, hyoscyamine and atropine. In commercial production, all plant parts are crushed and extracted in organic solvents. Most potent is the Mexican species, **D. inoxia.** Other members of the family Solanaceae that contain similar chemicals are henbane (**Hyoscyamus niger**) and a genus from southern Colombia, **Methysticodendron amnesianum.** The latter is sometimes called a tree datura and figures prominently in the medicinal lore of that area.

Without a doubt, the most famous member of the family Solanaceae is the Eurasian mandrake (**Mandragora officinarum**) which has been used for centuries as a painkiller, sedative and supposed aphrodisiac. According to "the doctrine of signatures," a concept prevalent in the 16th century, every plant reveals in its parts the use for which it is intended; thus, **Dentaria,** which is shaped like a tooth, was placed in the earth by the creator so that man might have a cure for toothaches. Herbalists writing of such matters capitalized on this peculiar notion and it became a lucrative profession to harvest and sell plants of reputed medicinal value. Fantastic stories were concocted and published to keep the common man from harvesting certain medicinal plants and destroying the market.

One of the most fantastic legends in all of plant lore concerns the mandrake, a low growing herbaceous perennial, with a few palmate leaves and a root which is so contorted and branched that it may, on occasion, take on the aspect of a man's body. Thus, in keeping with the doctrine of signatures, the herb would soothe the ills of mankind. Apparently further modification of the root was achieved by delicate carving which resulted in a conspicuous male and female mandrake (or womandrake, if you will). As a primitive anaesthetic it was of considerable value, for the root contains podophyllin, mandragorin, hyoscyamine and other minor alkaloids.

In order to insure that only the herbalist and his cohorts collected the plant, the following legend was put forth in several variant forms in most of the great herbals of the early renaissance:

> Mandrakes are to be found under gallows, for they issue from the ground where the semen of a hanged man has fallen. If a mandrake be pulled from the ground, it will come forth with such a shriek of horror that the collector upon hearing the cry will fall dead. However, if the herb be tied at the base of its rosette with a rope, and the

other end of the rope be tied to the neck of a dog, the dog may be persuaded to run from the plant by his master's call. Upon lurching forward, the dog will pull the plant from the ground and as a consequence will fall dead from the terrible scream. Collectors, however, will have taken the precaution of stopping up their ears with wool, and to have cut around the plant with double edged sword while murmuring incantations to protect them from harm.

In Genesis XXX we find reference to the mandrake in association with the fertility myth. Genesis XXX verses 14 to 16, tells the story of Rachel obtaining mandrakes from Leah, presumably to overcome the barrenness of her marriage with Jacob. Shakespeare found several occasions in which he was able to make effective dramatic use of the legend. In Romeo and Juliet, (Act IV, Scene III) Juliet muses with some trepidation on the spirits of the tomb and their ". . . shrieks like mandrakes torn out of the earth." King Henry VI (Part II, Act III, Scene II) has a potent scene in which the Duke of Suffolk utters the dread wish, "Would curses kill as doth the mandrake's groan." In other plays he refers to the use of the mandrake as a sedative.

Such notions, which seem ludicrous to us, were widely accepted and the market price remained high. There was an active trade with oriental women who bought the root to promote conception (which it does not do). If all of this seems absurd, we have but to consider a contemporary related phenomenon, that of ginseng **Panax ginseng** and **Panax quinquefolium.** The latter a member of the family Araliaceae and a native of our northeastern states.

At the inception of this century, itinerent herb hunters were collecting ginseng to export to China, for it greatly resembles the Eurasian mandrake in form, though they are in no way related. For the Chinese it was comparable to the earlier imported Mandrake roots. Also, **Panax ginseng** was becoming depleted in north China and the North American ginseng was sufficiently like that of the north China provinces. Well-formed roots of ginseng were actually worth their weight in gold. A tea was made of buttons sliced from this root and it was reputed, like mandrake, to heal the many wounds and sorrows of man. This led to a strange promotional gimmick a few decades ago. Aspiring fortune hunters were encouraged to buy the seed and reap a harvest of gold. Few realized that the crop must be grown in loam of temperate regions and requires **6 years** to mature. This, coupled with the plant's susceptibility to disease, discouraged most if not all of the farming for gold. A suitable ending to this story comes in a Los Angeles newspaper advertisement which I read only today. Powdered ginseng root is being offered as a cure-all at rather considerable prices. Doubtless there are some useful properties in the chemistry of the plant, these, however, are a far cry from an omnipotent curative. Russia and China both continue to consume large quantities of this herb and it is being given to some of the Russian astronauts. Once more, the Triumph of Reason succumbs to the Will to Believe.

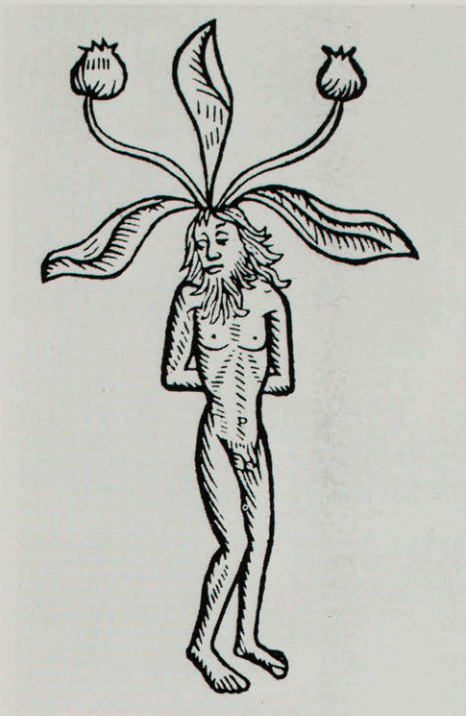
For centuries, the people of India have used a drug which they call **sarpaganda** to cure almost every ailment from insanity to dysentery. Holy men such as Mahatma Gandhi used it to promote states of meditation for which India has become so famous. A small bush of the family Apocynaceae known as **Rauvolfia serpentina,** or more properly **R. tetraphylla** (after the 16th century German Leonhard Rauwolf, who collected medicinal herbs in India) has a fleshy root from which this peculiar drug is derived. A related species (**Rauvolfia canescens**) from South America is used in a similar way. In the forests of Colombia and Guatemala, **Rauvolfia** is called **piniquepinique** and **chalchupa,** respectively, and is used for treating malaria and snakebite. There are reports from India which indicate that the mongoose eats leaves of **Rauvolfia** before doing battle with cobras. It is interesting to imagine what the mongoose does when he encounters his enemy in the absence of the herb.

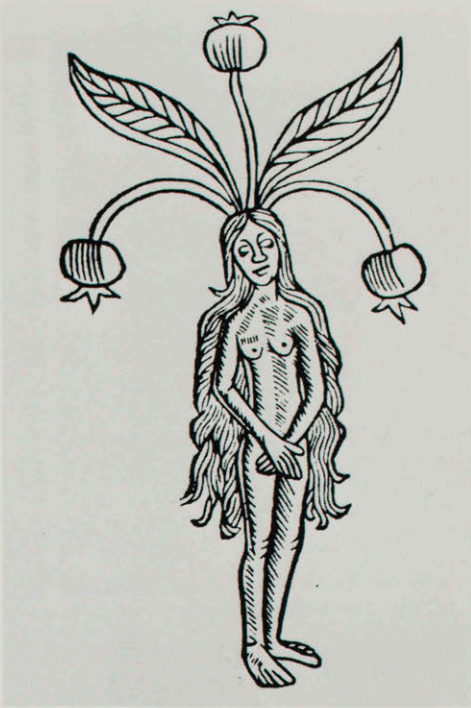
In the year 1947 Dr. Emil Schlittler found in the residue of an extract of **Rauvolfia serpentina** a substance which had the amazing power of tranquilizing laboratory animals without inducing the stupor and coordination failure (ataxis) which characterizes most sedatives. By 1952, Schlittler and colleagues isolated the crystalline substance responsible for this peculiar quiesence, it was named reserpine. Reserpine not only tranquilizes, but lowers blood pressure. Several days are necessary for reserpine to manifest its action and the complete effects are exerted only after several weeks. Such delayed action suggests that the material is transformed in the body into secondary substances which are active. Remarkable cures have been wrought in cases of acute schizophrenia, migraine headaches, high blood pressure, and reserpine has been very useful assisting addicts of opiates in their withdrawal. Western medicine finally found cures that the Indians of both the old and new worlds had found many centuries earlier.

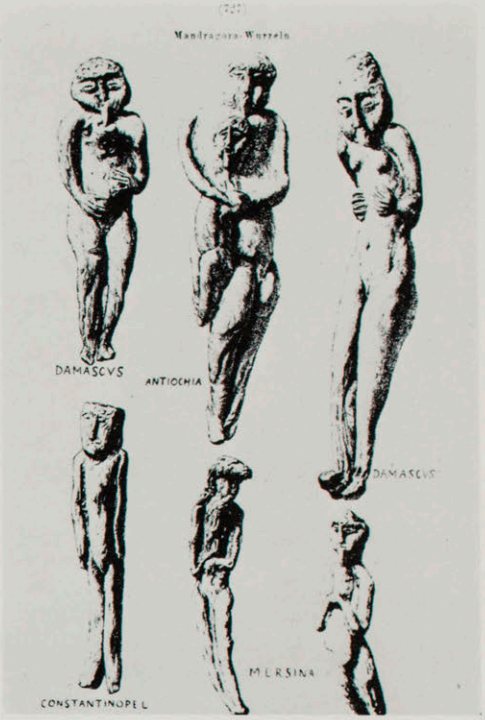
All of the sedatives and tranquilizers used by man are not from plants. Organic syntheses have produced numerous synthetic compounds which are just as effective as those from herbs. Perhaps we are only now learning what aboriginal peoples have always known, and what a Guatemalan Indian revealed so eloquently to the toxicologist Lewis Lewin, "Man must sometimes take a rest from his memory."

The thornapple *(Datura metaloides)* growing in southern California.

Three species of henbane *(Hyoscyamus)* from an early colored engraving.







Male mandrake from *Gart der Gesundheit* by Peter Schöffer, German printer.

Female mandrake from *Gart der Gesundheit,* an herbal of 1485 printed in Mainz.

Carved mandrake roots unearthed at Constantinople, Antioch, Damascus and Mersina.

A woodcut of venus and the mandrake from *The Dialogue of Creatures Moralized* published in Geneva in 1500.

The North American ginseng *(Panax quinquefolium)* in fruit.

Deadly Nightshade *(Atropa belladonna)*. The plant of beautiful ladies and dangerous men.

An early colored engraving of the mandrake *(Mandragora officinarum).*

A ten year old ginseng root.

The Wizard of the West

Peter J. Talmachoff
Student Worker
History Division

The Nineteenth Century was the age of the Wizards—Edison, Ford, Bell, the Wrights, and countless other independent inventors. Although these men often had little formal education and even less financial support, they were largely responsible for the most significant technological advances of their day. A classic representative of this nearly extinct species is one pioneer of the motion picture industry, E. H. Amet, the "Wizard of the West."

Edward Hill Amet was born November 10, 1864, at La Grange, Illinois; and his life spanned the most exciting era of technological progress that this nation has seen. Today's newest lasers and spacecraft are rarely seen outside research-and-development centers, but in those days the presence of such radical and fundamental inventions as the telephone, the talking machine, the horseless carriage, and the aeroplane was felt dramatically by everyone. Like his contemporaries, Amet found a special fascination in these revolutionary machines. At the age of seventeen he received his first patent, for a new telephone design. His father had died two years earlier, and the boy helped support his family by inventing. Engineering was still at the unsophisticated state where a man such as Amet, who possessed innate talents for mechanics and electricity, could succeed even with little formal education.

As an associate of H. A. Streeter of Chicago, he spent his first years developing numerous devices including motor speed regulators, automatic recording scales for railroad cars, and coin-operated scales that gave the user a ticket with his weight printed on it. In 1892 he moved to Waukegan, Illinois, a small town on Lake Michigan about thirty miles north of Chicago. There, at 423 North Avenue, he set up a laboratory in the back yard of his home. Amet acted as a consulting engineer (his business stationery proudly displayed a photograph of the "Amet Talking Machine," a cylinder phonograph of novel design, which was marketed as the "Echophone"), but much of his experimentation was done alone in that home workshop. For a time he was associated with Thomas Edison, and he gained the appellation "Wizard of the West," as opposed to Edison's, the "Wizard of the East."

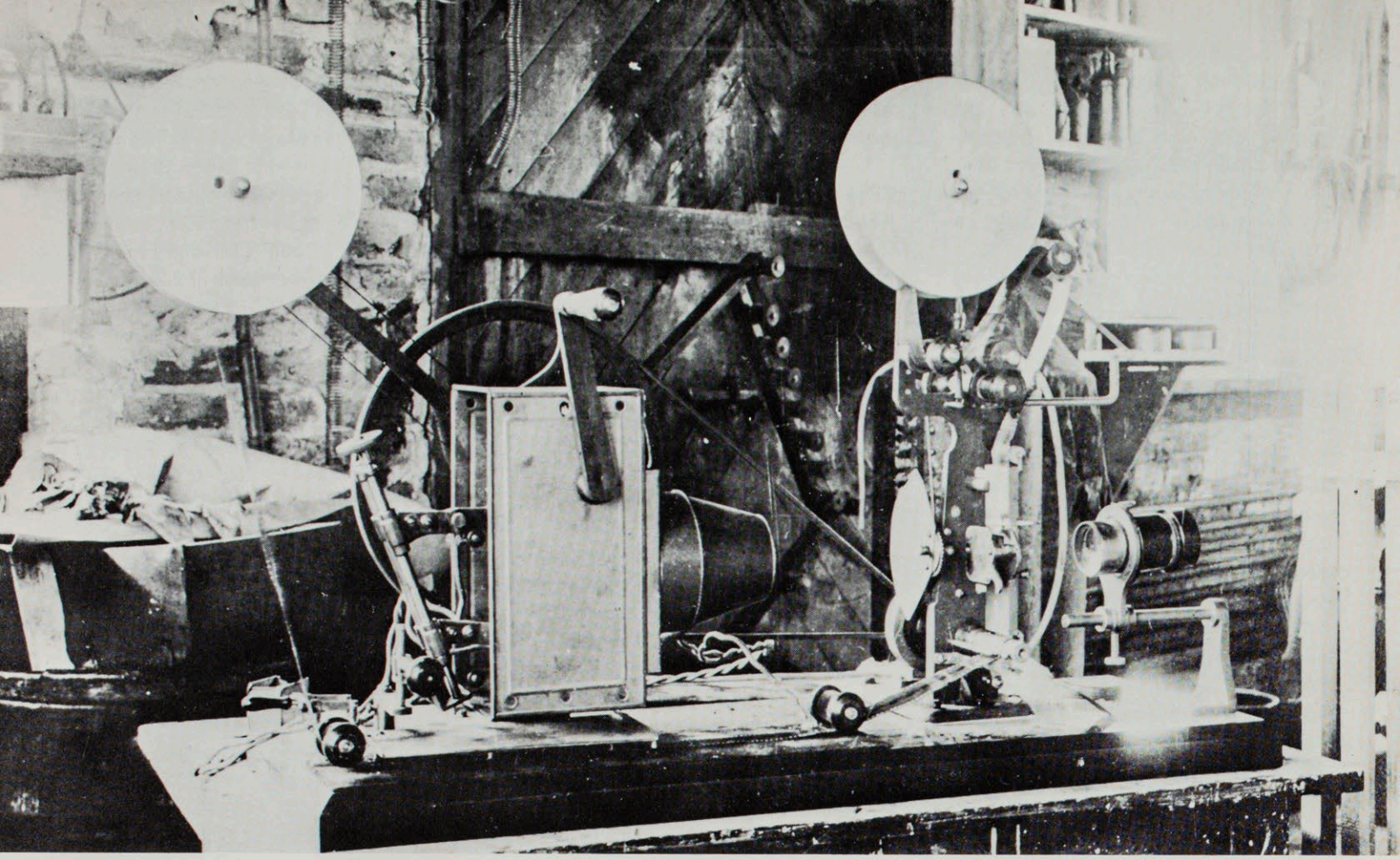
In the early 1890's Edison's "kinetoscope" boxes began spinning out photographic images of real people in hectic but startlingly lifelike movement. Once these first successful motion pictures had been publicly demonstrated, inventors throughout America and Europe turned their attention to the new art. Without knowledge of each other's efforts, Amet and several other men began work almost simultaneously to develop a machine which could project the moving images onto a screen. As a result, a furious battle soon arose in the United States patent courts between Thomas Armat, Herman Casler, E. H. Amet, and Woodville Latham (whose patent applications had been filed in the order listed). Amet withdrew at an early date, apparently because he could not prove that his own invention preceded the others.

Amet called his projector the Magniscope, and its invention had a substantial influence on the industry by a rather devious route. According to Terry Ramsaye, in **A Million and One Nights,** the incident occurred one night in 1895 at the Chicago Scale Works in Waukegan, where work on the Magniscope had begun. Amet wanted advice from a theatrical authority on the possibilities of the projection machine. The "authority" he chose, George K. Spoor, was counting receipts in the box office of the Waukegan Opera House when Amet approached. Spoor was talked into seeing the incomplete machine; then he finally asked the burning question: "How much capital will you need to finish this?" while wondering how he had let himself into such an embarrassing predicament. Unbeknownst to Amet, Spoor was the operator of a newsstand and lunchroom, not a "theatrical magnate." At the moment the only money he had was the $28.85 from the theater receipts of that evening. Amet answered slowly, "Well—it will take about sixty-five dollars to finish it—and I could use twenty-five right away." It was done. George K. Spoor was soon exhibiting motion pictures with the Magniscope, turning the crank with one hand while successfully fending off the already overworked patent lawyers with the other. Shortly afterwards he formed the Essanay Film Manufacturing Company, which grew into a famous and powerful concern and netted Spoor many millions of dollars.

Meanwhile Amet was busy making his own motion pictures for exhibition. Anything that moved, no matter how commonplace, became an object of wonder when its lifelike image was projected onto a screen. Films were made of a circus parade in Waukegan, a sleigh on a snowy road, and some local pigs. The films were processed in the back-yard laboratory and hung vertically to dry in the building's three-story tower. At the time of the Spanish-American War, Amet produced a highly unusual propaganda film. First, an American flag was photographed while waving in the breeze. The developed positive film was then laboriously tinted, frame by frame; each stripe on each image was tinted with a line of red, and each field of forty-five stars was covered with a sweep of blue. Naturally this process for making a color picture could only be inaccurate, and the colors danced on the screen, but patriotic Americans were delighted. A segment of this film is now in the Museum's collection. Even more remarkable, however, was Mr. Amet's wartime motion picture of "The Sinking of Cervera's Fleet."

In his back yard Amet reproduced the Battle of Santiago Bay. A large pond was constructed with a painted backdrop. The ships were very carefully and accurately built, with turrets and flags and smoking stacks. The guns and ships were operated by remote control to recreate accounts of the action. According to Terry Ramsaye, the reconstruction was so well done, and the technique so new, that Amet was able to release the film as a documentary taken from a vessel at six miles' distance. No one ever challenged the authenticity of the film; in fact, one copy was purchased by the Spanish government for its military archives. A naval officer who had been at the battle wondered how Amet could have captured on film the scenes of dynamite bombs exploding, since these were fired only at night. "Moonlight film," replied the Wizard!

Edward Amet was primarily an inventor; most of his devices were sold as soon as they had been perfected. The Magniscope and a motion-picture camera went to George K. Spoor. The remainder were bought by Williams, Brown, and Earle of Philadelphia. Amet went on to install electric lights in St. Louis; he exhibited motion pictures there during the Louisi-



One of the first four motion picture projectors was this Magniscope, built by E. H. Amet about 1895.

ana Purchase Exposition of 1904. Two years later he moved near Phoenix, Arizona, to develop a producer-gas generator. The objective was to generate a gas from crude oil which could be used to run internal-combustion engines, as in electric power plants. Tests were conducted at Western American Gas Company's plant in Yuma in December, 1908. The results showed an operating efficiency for the "Amet-Ensign System" well above that of contemporary steam or oil distillate systems, especially for small-scale operations. The Amet-Ensign rights were also sold, and Amet moved to Redondo Beach, California.

By 1912 the motion picture theater had taken the place of the kinetoscope parlor. The picture was there, as big as life, but it was mute. Thomas Edison introduced his own talking movies that year, with sound provided by a cylinder phonograph behind the screen. Unfortunately, the sound often got out of step with the picture because synchronization depended too much upon the skill of the operator. Amet decided to solve the problem by making synchronization entirely automatic. Richard R. Freeman, a founder of the American Savings and Loan Association and now a resident of San Diego, remembers helping Amet take his talking movie camera out to Amet's ranch in Newhall. The camera was set on its tripod and the battery attached. The microphone was fixed to a long horn and set on another tripod nearer the tracks. As the steam locomotive approached, Amet began turning the camera's crank; the phonograph recorder, which was linked directly to the camera, began turning, too. Quickly, Amet punched a button which simultaneously marked the film and made a buzzing sound on the record. He continued to grind away as the train ran past. Later, when the film had been printed, the synchronizing mark was punched out. Amet placed the record on the projecting machine and turned it until he reached the recorded buzz. The film was started, and as the special perforation came past, a pneumatic switch in the film gate automatically started the recording. A telephone circuit carried the sounds to a speaker behind the screen. Success! The engine chugged across the

This picture of a locomotive is taken from a talking movie made in 1912. Such subjects as a train or a pile driver were chosen because they produced sounds loud enough to be recorded with the rather insensitive equipment of the day.

screen, its whistle blowing and bell clanging just as in real life. The motion picture was learning to speak!

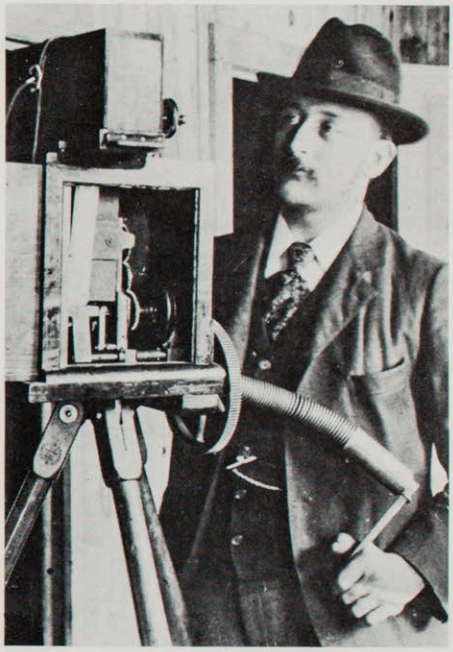
The most significant part of Amet's talking picture system was his use of electrical recording. At that time all phonograph records were made by shouting into a horn; the sound was focused onto a vibrating diaphragm, which inscribed its vibrations directly onto the record. By abandoning the old technique, Amet could place the microphone near the actors while the phonograph remained securely coupled to the camera. Numerous "talkies" were made and exhibited to private audiences in Oakland and Berkeley, but many obstacles seem to have hampered successful public showings.

During the Twenties, Amet and other experimenters, including Dr. Lee DeForest, abandoned the phonograph for today's sound-on-film process. Ironically, the first commercially successful talking movie, "The Jazz Singer" (1927), was made with a synchronized phonograph record and electrically recorded by remote microphones. The only essential difference between this film and Amet's "talkies" of 1912 was the use of high-quality sound amplifiers. Until the Twenties, no amplifying system could produce sound imposing enough and realistic enough to compete with the screen for attention.

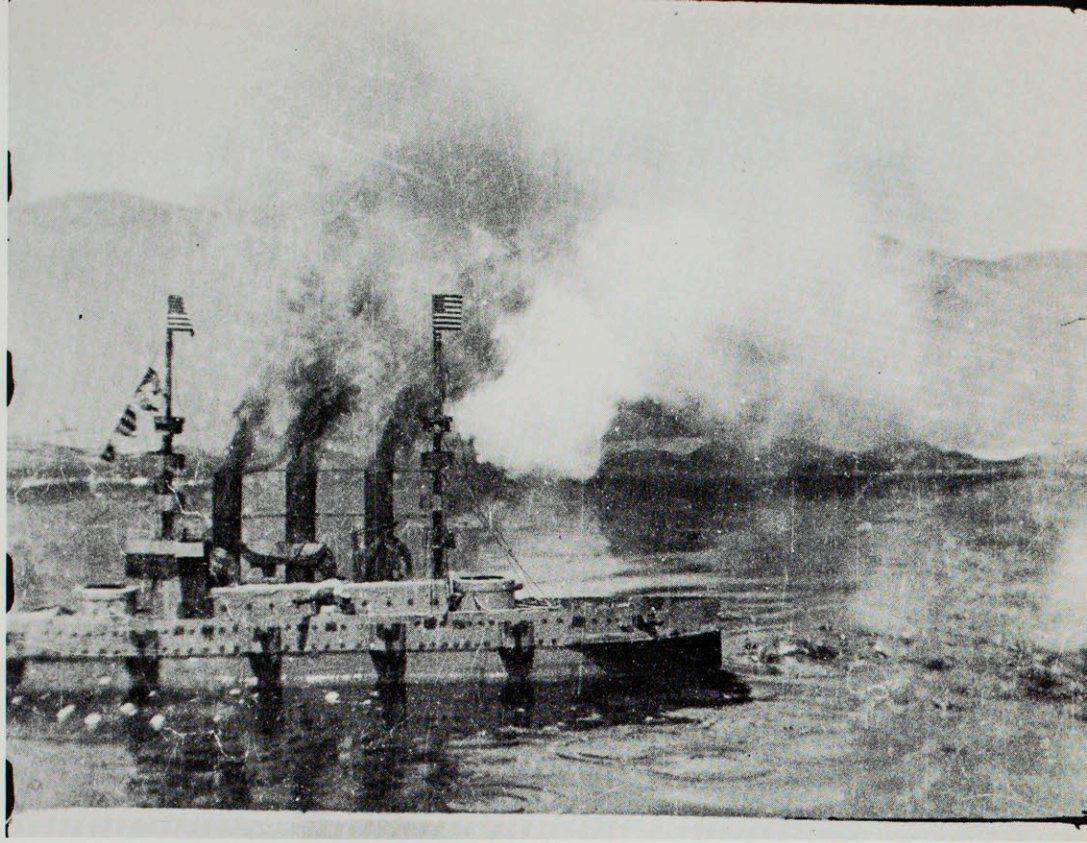
Meanwhile, Amet continued experimenting in other fields. In 1912 he transmitted a picture by telephone—an amazing feat at that time—and he recorded the picture on a phonograph cylinder which is now in the Museum's collection. He built a glider and talked a trustful friend into flying it over the Palos Verdes hills. He constructed a three-dimensional motion-picture screen. During the First World War, he developed a directed missile, which was sold to the British government. His work on sound amplification found form in a tubeless amplifier, which was manufactured in small quantities to operate loudspeakers from crystal sets. During his eighty-three years he received fifty-eight patents on all manner of devices, from a "fire escape" (1889) to a bowed musical instrument, the "ethelo" (1908). Much of his later experimental apparatus, including some talking picture machines, was donated to the Museum.

Today's technological advances come from huge research laboratories with enormous budgets and large staffs of Ph.D.'s. It seems that any problem can be solved if enough money and enough minds are devoted toward its solution. However, we should give due credit to the hundreds of independent inventors of another era who, like Edward Hill Amet, worked without guarantee of financial compensation to bring us the basis for the technological progress we now enjoy.

Much of the information in this article was taken from the personal papers of Edward Amet, now in the Museum's collection. Of considerable value was Terry Ramsaye's **A Million and One Nights,** (New York: Simon and Schuster, 1926). The author would also like to express his appreciation to Mrs. Florence Bertelsen, Mrs. Vivian Amet Shafer, and Mr. Richard R. Freeman, for the assistance they have given him in preparing this article.

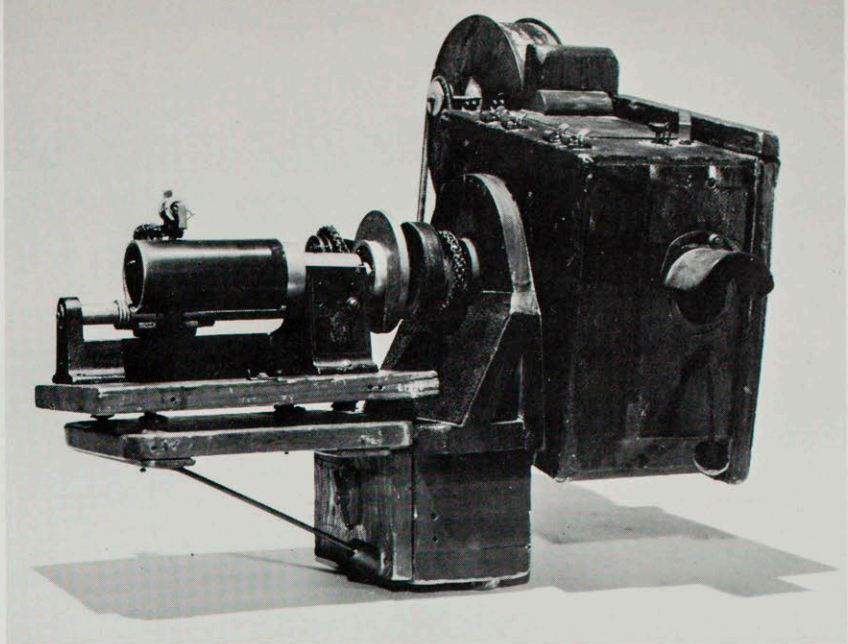


E. H. Amet is seen here with his 1896 motion picture camera, which was later used by George Spoor of Essanay. The spring crank reduced vibration.



When it first appeared, many people believed this film to be a documentary of a battle of the Spanish-American War. Actually, it was made in Amet's back yard.

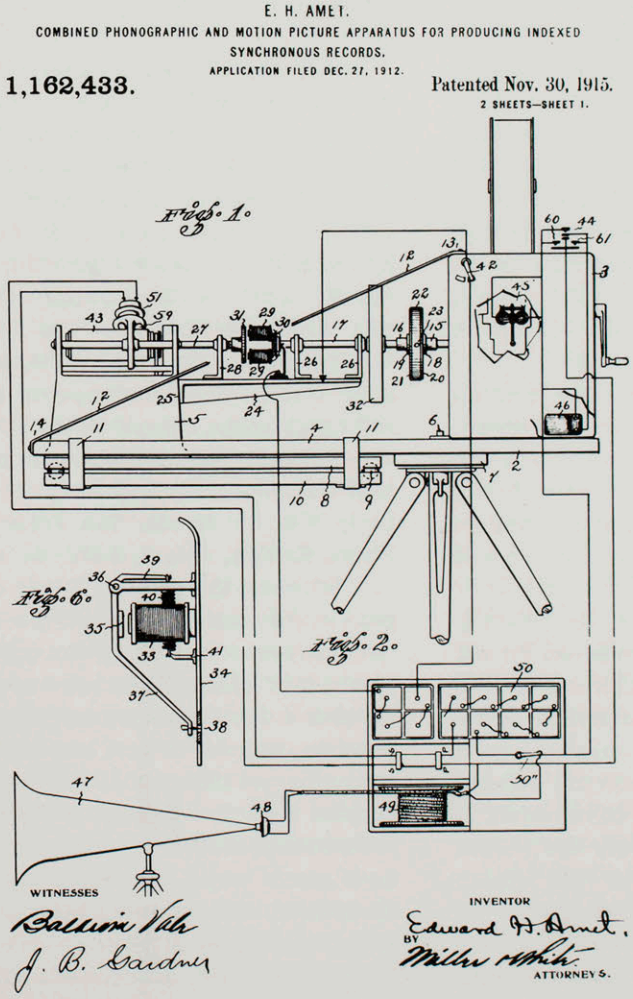
E. H. Amet and friends are seen here making a talking movie in May, 1912. At the left is the camera with a cylinder phonograph attached to record the voices of the actors. At the right is a microphone on the end of a large phonograph horn.

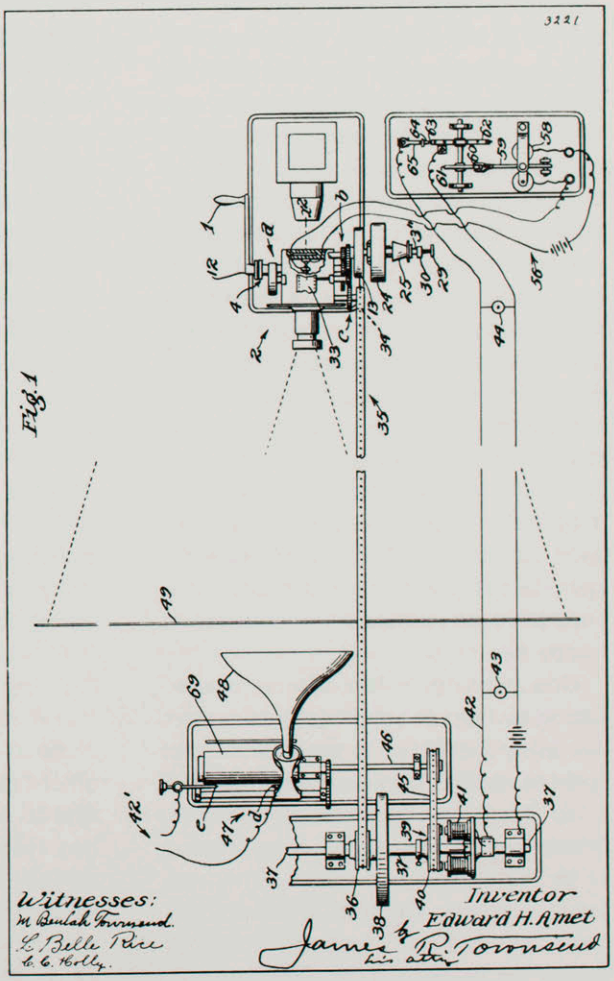


This camera was used by E. H. Amet to make sound movies. At the left is the wax phonograph cylinder; above the cylinder can be seen an electric recording head. This completely homemade device is now in the Museum's collection.

This patent drawing shows how Amet's talking movies were reproduced (United States patent no. 1,065,576). The phonograph, behind the screen, was linked to the projector by a belt. For greater convenience, the phonograph was sometimes set beside the projector and the sound carried electrically to a speaker behind the screen.

The circuit for Amet's sound camera of 1912 is shown in this drawing from United States patent no. 1,162,433.





The Joseph Lee Painting

Before restoration. The ripped canvas, complete loss of paint on the right-hand side from water damage, and the thick, dark varnish are clearly seen.

John Dewar
Associate Curator
Western-American Art

There was a time when the basement storage of the Museum held a huge nondescript group of paintings. This is not unusual for museums in general, as over the years there accrues much material that is of little value. It comes from innumerable sources and situations: material willed to the museum, material simply left at the back door, deposited through different policies and administrations. Many times, rather than lose a solitary important item, a number of objects to which the donor is impartially and sentimentally attached are accepted.

As a museum grows, it becomes more discriminating, fulfilling its obligation to show prime examples of its exhibit material, with less emphasis on the second-rate and, as storage is always a problem, it becomes necessary over the years to weed out the non-usable material. However, to paraphrase an old maxim, one curator's junk is often another curator's treasure.

One morning, before the removal of these paintings to another and drier storage area, I decided to look them over and see whether there was anything that could be of any possible use. The Art Division was leaving and there were going to be many large blank walls. Unknown family portraits, still lifes of flowers and dead fish, and the usual assortment of copies comprised the lot. One painting, however, attracted my attention. It was of an unusually long and narrow shape, badly damaged, with one end completely ruined from having stood in water. A thick coat of dark brown varnish obscured its details. The general appearance of the landscape — for that was what it was — seemed to have a particular "primitive" charm. I carried it upstairs to the painting storage area for further examination. There in better light, it was not difficult to make out the lettered sign which spelled Presidio House, and it was at once obvious that this was probably an early painting of San Francisco.

Later, I was able to show it to an authority of paintings of the Bay region, and he carried news of this find, along with the artist's name, home with him to San Francisco. It was at the time an exhibit on the works of Joseph Lee was being formulated, and I received a letter asking for the inclusion of the painting.

It did seem that the time had arrived to properly evaluate it, but it was obvious that it must undergo restoration before it could be exhibited. Through the good offices of the Museum Alliance, we were able to send it to some conservators in San Francisco, who already had worked on Lee paintings. Through their superb work, the beauty of the painting as an important work of art was revealed, as well as its importance as an historical document. Restored and elegantly framed, it made its debut in the exhibit of Joseph Lee paintings at the Mansion of the California Historical Society in San Francisco.

Joseph Lee is a mystery among Western artists. Almost nothing is known about him, particularly rare for San Francisco where the bohemian spirit of conviviality led to some sort of reminiscences in the camaderie of artists and, at least by 1879, there was some sort of fraternity for Langley's San Francisco Directory reports on April 22, "The Annual Reunion of San Francisco Art Association." But, it was for a newspaper critic, writing under the nom de plume of Caliban, to leave the clue which probably best explains Lee's anonymity. In the **Daily Alta California, San Francisco Times,** Sunday, June 5, 1870, we read: "... for of all the thousands that compose it, (the community San Francisco) how many are lovers of art? Not one in a hundred; at least it would seem so from the poor support extended our painters. It is true, we have no very eminent men among us: yet there are several who occupy an honorable position in the craft, and whose production among a more refined people would be favored with acclamations. Here they are simply looked at and passed by in silence, while the artist has either to abandon his pursuit

of the Presidio House 1868

After restoration.
The Presidio House,
San Francisco, 1868.

or remove to a more appreciative community."

In spite of this, it is interesting to note that a painting, **A Glimpse of the Pacific,** a landscape of the region near the Cliff House by Mr. Gilbert Munger, sold for $1,000, "a high figure, but not above its value."

This critic who, with a brief biographical sketch could have assured himself a certain immortality, forfeited all claim to such by substituting a critical analysis of Lee's work, the worse for having missed the man's particular genius: "A painter, who has for some time 'dabbled in the dark,' has recently emerged from his somnolescent state, and shows several pictures which indicate merit. Of these, the best is a sea piece representing a wreck off a cluster of rocks in a storm. The vessel is very neatly painted, the sky is not bad, and some parts of the water are quite nicely handled. There is, however, a 'veneerism' or rather a hardness about this artist's productions which is disastrous to a rigid picture of nature. More softness is required; then we may look for something meritorious. Mr. Lee has the feeling, all he wants is a freer and more natural touch to make his works worthy of admiration."

Among the thirteen artists reviewed is a Mr. Frederick Shang, who did "still life and fish (well done) and portraits," a name which, like Lee, could be Chinese, or at least suggests the possibility that something about his background excluded him from the fraternity of artists. These very editions of this newspaper carry short editorials condemning the activities of young hoodlums who stand on San Francisco street corners abusing the Chinese by stoning them as they walk by.

Whatever was his origin and background, it is reasonable to believe that he worked in San Francisco from, roughly, 1860 to 1885. In the Pacific Coast Business Directory of 1871-73, in the Museum Library, page 535 of the section devoted to San Francisco under "Painter, House, Sign and Ornamental," Joseph Lee is listed at South Broadway near Mason. By 1879-80, he was listed in Langley's San Francisco Directory both as a marine painter and marine artist — landscape and marine — with his office given at both 803 Montgomery, room 9, and Bedford Place, near Jackson. These categories explain his work—for the bulk of his paintings are of ships familiar to the port of this city. But always, ships and landscapes alive with a myriad assortment of meticulously painted figures —people, animals and birds.

The Presidio House on Presidio Road, south of the Spring Valley Flume, burned in 1872 after at least four years' existence, for it is first mentioned in an 1867 San Francisco Directory. It was on land owned by F. Weisenborn, a tract which encompassed what are now Lyons, Baker and Broderick Streets.

The painting illustrates in detail the Presidio House and its surrounding buildings and orchards. On a fence is a poster for the Union ticket and P. Quinn. At the far left of the picture is the dispensary, one of the few remaining buildings in the Presidio today. Fort Point and the barracks form its background, that point from which the Golden Gate Bridge now originates. The Bay, the purple Marin Hills and a luminous sky make up the rest of the picture. On the Bay, Lee has minutely rendered a number of boats: a sloop, a schooner, a sloop, a steamer, an Italian fishing boat, two sloops, a naval vessel, a brigantine and another schooner.

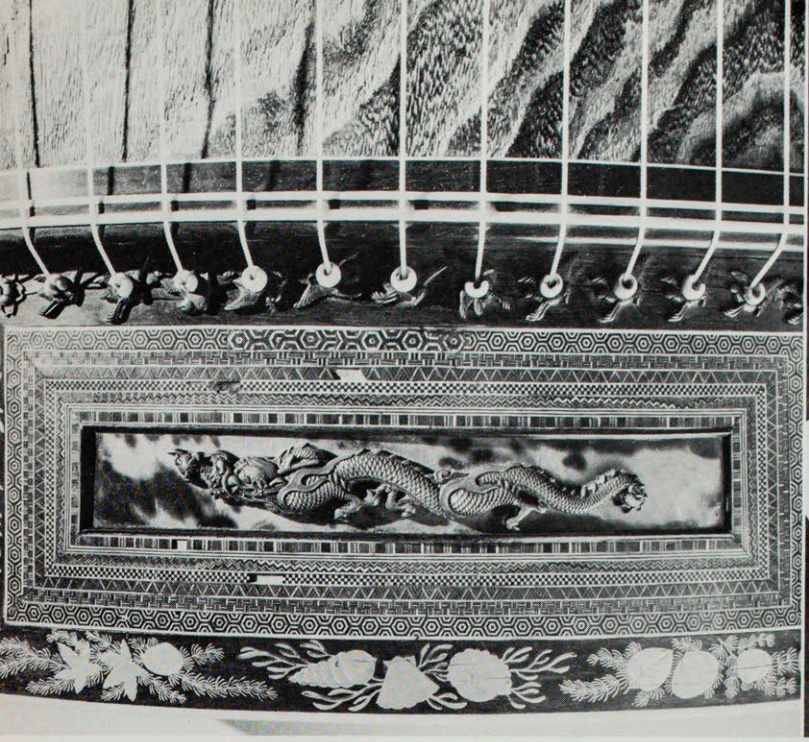
The painting of **The Presidio House** by Joseph Lee is unquestionably an important addition to the Museum collection. This is no anecdotal Western painting, but the faithful rendering of a scene by an artist who stood on the spot before his easel, the sort of painting to fascinate any historian.

Koto, Shakuhachi and Shamisen:

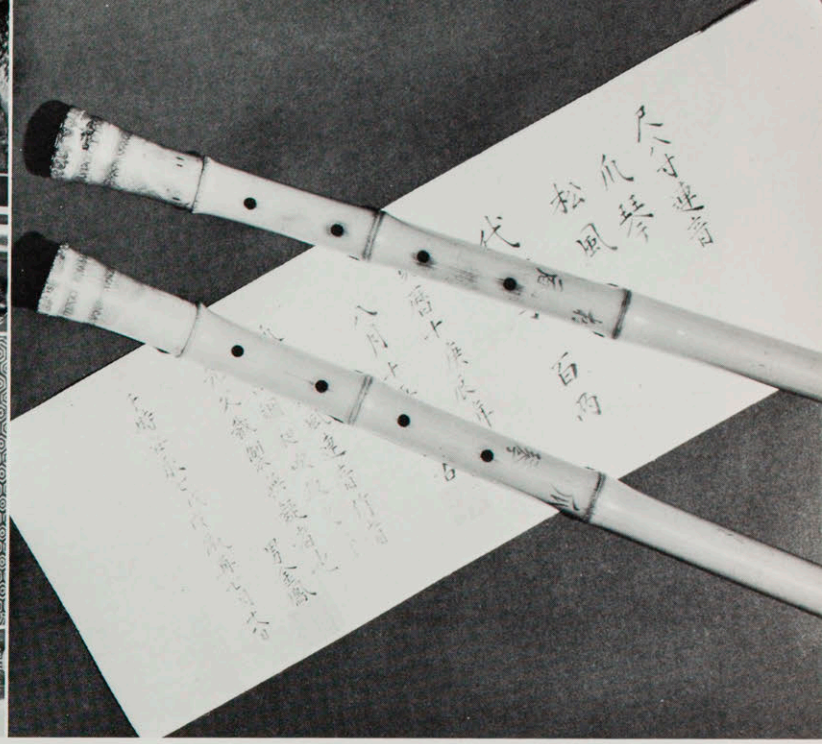
a Brief History of Japanese Music

by **Kayoko Wakita**

(Source — material for this article has been provided to the writer by her father Baido Wakita, an authority on Japanese music, whose articles have appeared in several Japanese music publications.)



Early 18th century koto head section and part of keyboard. Ivory and tortoise shell and ebony inlay decorated with a silver dragon which is representative of the koto.

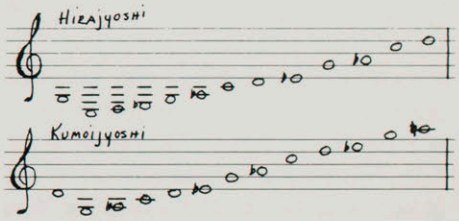


Oldest shakuhachi pair named Tsumagoto Koto-female and Matsukaze Pine-Wind-male. Made in 1760 by Kinko, founder of the Kinko School of Shakuhachi. Parchment provides evidence that the instruments were made by Kinko and sold for 100 gold pieces.

Pythagoras, the Greek philosopher experimented (500 B.C.) on the numerical and tone relationships which led to the development of the scale procedure in Greek music. Some 1200 years later, and approximately 1200 years ago, China introduced the method of finding the 12 tones in music to Japan. Using a long string tuned to the bell at the Tennoji Temple of Rokuji-do in Osaka (which registered "A") as the basic tone, the string was divided into thirds and one-third discarded. The remaining length was divided into thirds again, then the discarded first third was added which provided the second tone. They continued in this manner until all 12 tones were found.

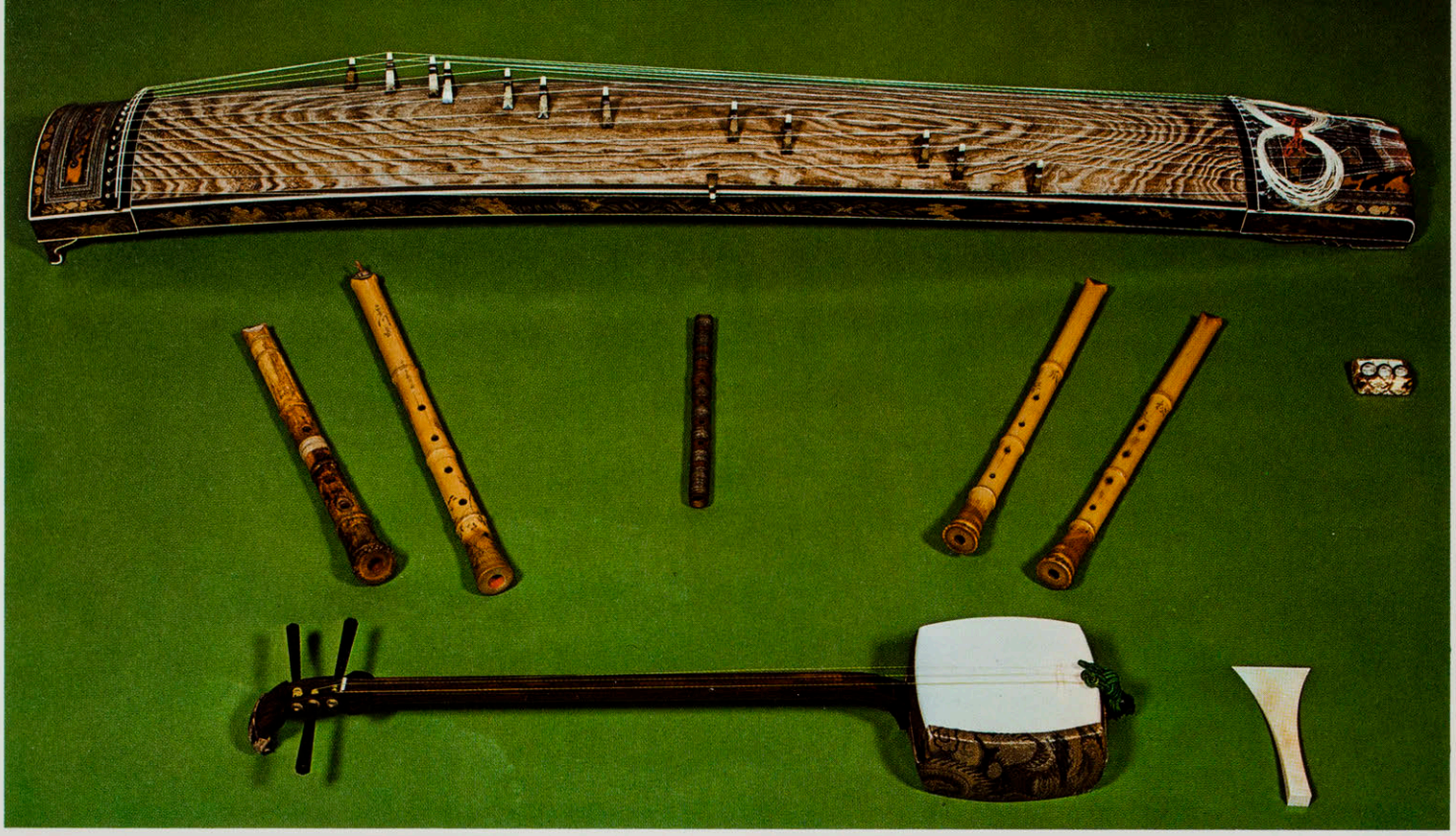
In 612, a Korean scholar named Mimashi introduced the instruments and dances of the Korean court to the people of Japan. Later, music of China, India and related areas were introduced. During the height of the T'ang dynasty (618-906 A.D.) Japan imported the court instruments and music of China which have been retained almost intact in Japan today. This is not only important to the history of Japanese music but to Chinese music as well for contrary to the steadiness of the Japanese the Chinese unfortunately with each dynastic change abolished and destroyed the music of the preceding dynasty.

The three most popular traditional instruments which are still in use today are: the **koto** (horizontal harp), **shamisen** (three-stringed banjo) and the **shakuhachi** (bamboo flute). The koto is approximately 6 feet long and made of paulownia wood which is hollowed and carved to provide a sound box over which are stretched 13 silk or nylon strings with 13 movable ivory, wooden, or plastic bridges. It is played with three ivory picks worn on the thumb, index, and middle fingers. The left hand is utilized for pulling or pushing on the left side of the bridges, for slurs, sharps, vibrato, and subtle nuances. The left hand is also used for plucking along with the right hand on the right side of the keyboard. Though traditionally played upon the tatami (straw mat) floor, it can be placed on elevated stands with the performer seated on a chair. The instrument can be traced to approximately 200 B.C. and it is believed that it appeared then very much as it is today. Along with other instruments, the koto was considered too precious for the plebian class and was retained in court and available only to court nobles and their families. Musical democratization began, however, during the early 17th century when a blind musician named Yatsuhashi (1614-1685*) befriended a musician of high rank and persuaded him to teach him the koto. This musician, as a result, lost his rank but it enabled Yatsuhashi to pave the way for introduction of koto music to the common people. Two basic tunings attributed to Yatsuhashi are: Hirajyoshi (Tranquil Tuning) and Kumoijyoshi (High Tuning).



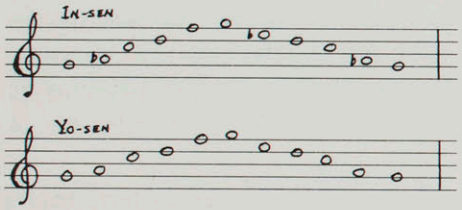
Although both tunings are used for solo music, they are often used for koto duets by tuning them exactly a fifth interval apart as is shown above. Yatsuhashi is also credited with originating the In-sen or minor mode (note it consists of the 5th to the 10th notes of Hirajyoshi). The Yo-sen or major mode orginated from court music. It is interesting to note that folk songs which

* The year Bach and Handel were born.



At the top: Koto
Center, left to right: Shakuhachis: — Modern; Late 19th Century; "Hitoyogiri" (ca. 16th Century); Matched Pair, 1760; Koto Picks and Decorated Box.
At bottom: Shamisen and Ivory Pick

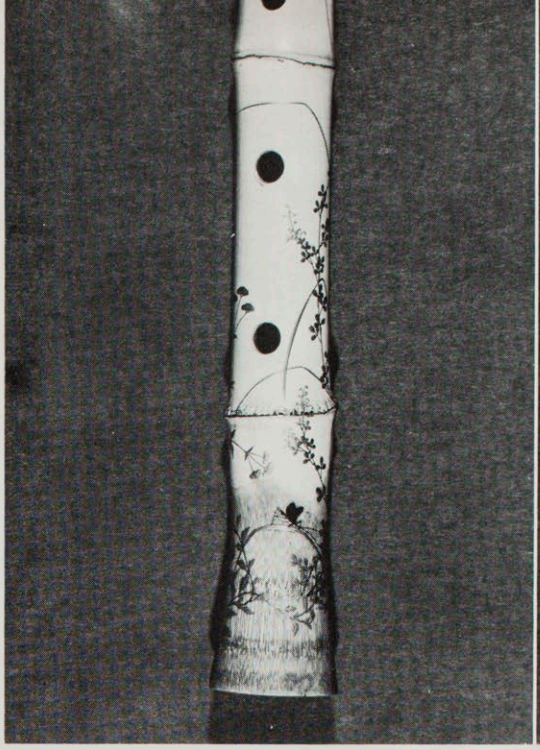
emerged from the countryside were usually in the major mode (generally likened to "happy," "hopeful") while those of the cities were in the minor (or "sadder") mode.



It is often stated that the Japanese scale is pentatonic (five-toned), however, one will notice that the above modes in descending have an altered note which gives the scale a total of six rather than five tones. Although Yatsuhashi may be regarded as the founding father of koto music, the schools that emerged later were called the Ikuta and Yamada schools. These followed the names of later innovators who codified their own methods in teaching. It should be mentioned here that the majority of musicians throughout Japanese history have been blind, and there are certain understandable reasons for this. Beyond the fact that blind people are more sensitive to sounds than the sighted and that the musically inclined blind are uncommonly sensitive in this direction, the added attractiveness of music as a dignified profession for which the blind could qualify, was a powerful incentive. Secondly, blind musicians were popular as entertainers —for often people of high rank frequenting gay quarters preferred to remain anonymous. In the atrophy of time blind musicians moved to protect the preserve of music which they had staked out for themselves and a type of union was formed by these musicians to protect their interest. They appealed to the government to pass a law whereby only blind musicians could teach the shamisen and koto. There was to be an ironic twist later with the emergence of the Kabuki (drama) theater where shamisen players who were not blind, formed a union to prohibit blind musicians from playing. Their reason — blind musicians cannot observe the drama and dancing, therefore, are unable to accompany them properly.

In another move to protect pre-eminence during the 18th century, after an extensive repertory had been composed, another edict was requested and passed whereby new compositions for koto were prohibited. Only those pieces already composed could be played. A limiting factor may have been that no musical notation was useful to the blind and the repertoire could not grow beyond those pieces capable of being held in memory. A musical notation was introduced into Japan in the 16th century when Portuguese and Dutch merchants introduced a variety of Western instruments and church music to Japan. In fact, there is evidence that the Japanese musicians applied these notations in their music but unfortunately, all things foreign including music notations were banned when Japan closed its doors to the West.

After the edict restricting the koto composition was passed, the inevitable circumventing idea appeared. A koto teacher named Ikuta (1655-1715), who studied with a student of Yatsuhashi's hit upon the idea of a duet between koto and shamisen. Utilizing the existing repertoire, he wrote contrapuntal type duet parts for shamisen. This emerged as the first kind of duet form and heralded the emergence of the Ikuta style or Ikuta school of koto as it is known today. In 1815, a hundred years after Ikuta, another teacher named Yamada (1757-?)

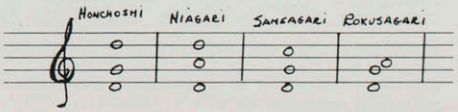


Lower portion of a highly decorated shakuhachi. Made in 1868 by Araki II, who improved the instrument.

Lower portion of a highly decorated shakuhachi. Made in 1868 by Araki II, who improved the instrument.

founded a koto school.

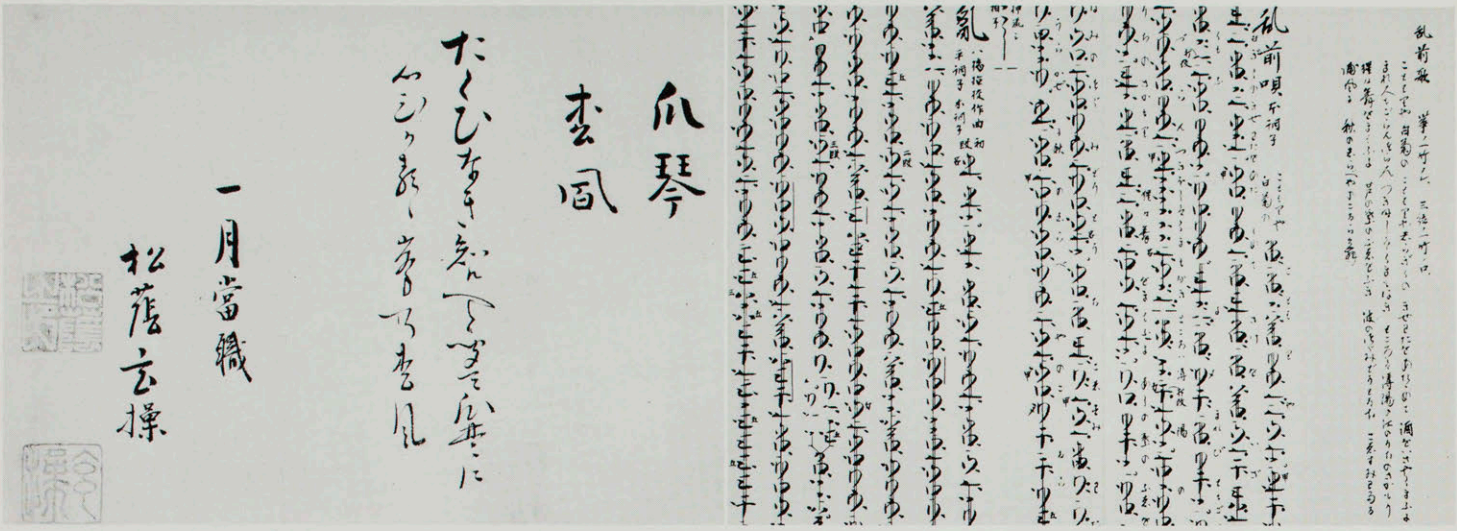
The shamisen, a banjo-like instrument, was introduced from the Ryukyu Islands at or about 1562. At that time, the body or sound box of the instrument was covered with snakeskin. As Japan did not have snakes large enough for this purpose, the feline and canine skins were employed. Also, many musicians who took up the shamisen were also lute players and the large plectrum with which they played the lute when applied to the shamisen had distastrous results. In make-up the shamisen has a round box affixed with a long wooden rod. At the end of the box, 3 silk strings are secured, then placed over a single bridge made of ivory, buffalo horn, or bamboo which rests flat upon the skin of the sound box. The strings are stretched over the long rod and wound around 3 small rods of ivory or wood. The length of the strings between the bridge and the upper rod varies according to the type of music that is played. There are 3 types of shamisen which vary slightly. One might compare the difference to that of a violin and viola. The most popularly used shamisen is the Nagauta (literally "long song") shamisen which accompanies traditional dance and song in the Kabuki theater. The rod of the shamisen used for Jiuta (which forms the trio with koto and shakuhachi) is slightly longer and wider. The Gidayu (narrative music used in the puppet theater) shamisen is the widest and longest as well as having a larger sound box. The shamisen can be regarded as a percussion as well as a stringed instrument—for the large plectrum with which it is played (made of ivory, plastic or tortoise shell) not only plays upon the string but also strikes the skin on the sound box. There are four basic shamisen tunings:



One will note that in the Honchoshi (Basic Tuning), there is an interval of a perfect fourth between the 1st and 2nd strings and an interval of a perfect fifth between the 2nd and 3rd strings. In this tuning, the open 2nd string is the Tonic (or Key note). The other tunings vary in a number of ways interesting only to students of the shamisen, and musicologists. This is explained in a footnote at the end of this article.

With the exception of ensemble music, the shamisen is not tuned to any definite pitch—which means absolute freedom in transposition. One might call the shamisen the most popular of the traditional instruments. Its size (the instrument can be dismantled into 3 separate parts for carrying) undoubtedly enhanced its favor. This, with other factors, so increased its popularity that it supplanted the lute in general use.

Scholars are divided in their theory regarding the origin of the shakuhachi, or bamboo flute. Some believe that it was imported from China during the T'ang dynasty. Others believe that a smaller flute such as the Hitoyogiri (13⅛ inch bamboo flute) was introduced by way of Viet Nam and modelled from a larger bamboo, a perfect fifth lower, by Kinko, founder of the Kinko School of Shakuhachi. During the early 17th century, the shakuhachi was made from a single piece of bamboo utilizing the root or clump as the bell. At this time there were many civil wars in Japan; and lords who lost the wars were stripped of their rank and wealth leaving their samurai (Knighted) followers masterless. Many of these men became priests and often

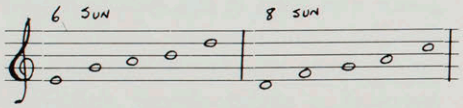


A poem written by a monk honoring the shakuhachi pair. Alluding to lovers it expresses, "Awed by its incomparable beauty (Tsumagoto), Matsukaze was attracted."

Shakuhachi score developed in 1885 still in use today. Read top to bottom, right to left.

emerged as shakuhachi-playing beggar priests. There were also many capable samurais who were employed by the local governors, using the disguise of priesthood, to spy on the countryside. As these priests were not allowed to carry weapons, the club-like instrument of the flute in the hands of an experienced swordsman proved sturdy weapons of defense.

For musical use, the shakuhachi has four holes in the front and one in the back. It has an angular mouthpiece with the sound produced by playing against this sharp edge. The angularity of the mouthpiece and the application of the lips of the player, regulates the pitch of the instrument. There are a variety of ways of half-holing and plugging the holes so that a capable player is able to encompass three octaves. Although the flute has only five holes it is possible to produce the diatonic scale, though this is somewhat difficult. All vertical flutes at one time were regarded as shakuhachis; and though the word implies a certain size flute this is no longer applicable due to the variety of sizes that exist. The two most commonly used shakuhachis are: 8 Sun (21½ inches in length, and 6 Sun (18¾ inches in length).



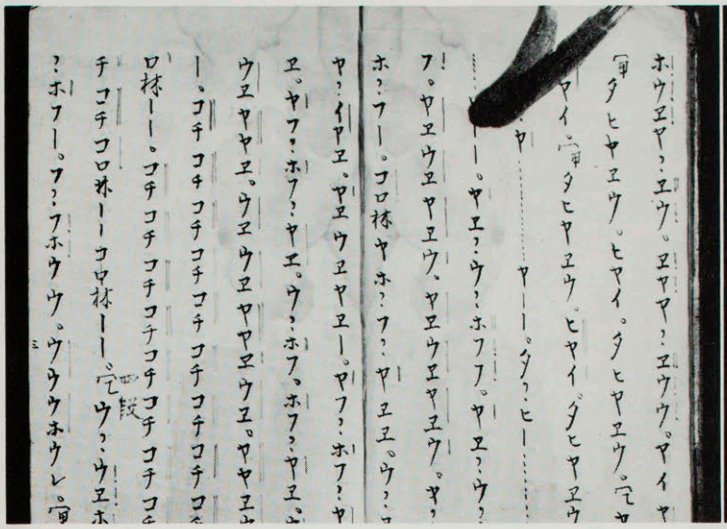
The varying lengths of the shakuhachi by 1⅜ inches determines the pitch by half-steps. Latest evolution of the instrument occurred about 80 years ago when a samurai named Araki II cut it in half, altered the placement of the holes, refined it and appealed to the government to recognize it as a musical instrument. In a further extension of repertoire he composed and arranged shakuhachi music to form a trio or "Sankyoku," with the koto and shamisen. This trio, or Sankyoku, is considered the most sophisticated form of Japanese traditional chamber music.

Perhaps the greatest difficulty in learning Japanese music and instruments lies in the fact that the notation differs from school to school as well as for each instrument. In recent years, however, ensemble music has been published in musical scores similar to western practice. Still a lingering difficulty is the fact that notation for each instrument remains different, necessitating a wide knowledge of notation.

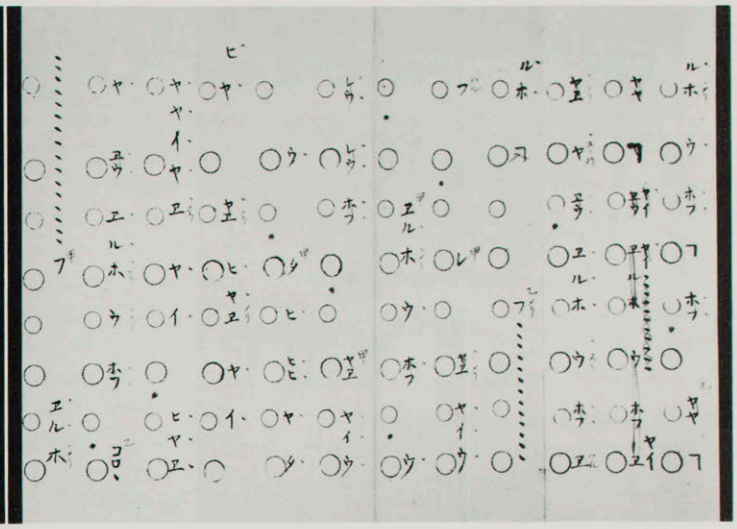
Music of the East and West may seem to have a wide gulf between them; yet, one discovers that fine artistry and creativity are universal and provide a strong bridge of cultural understanding.

NOTE:
OTHER TUNINGS OF THE SHAMISEN

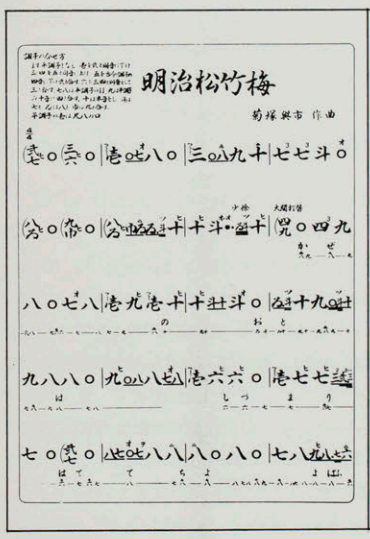
In the Niagari (Raised 2nd), the intervals are reversed from the Honchoshi, with the perfect fifth between the 1st and 2nd strings and a fourth between the 2nd and 3rd, the Tonic being either the 1st or 3rd strings. In Sansagari (Lowered 3rd), the intervals form a perfect fourth resulting in a minor seventh apart between the 1st and 3rd strings, the Tonic being either on the 2nd or the 3rd strings. When modulating within a composition from Niagari to Sansagari, it is common practice to raise the 1st string rather than lower the 3rd. Also, when the modulation then occurs from Sansagari to Honchoshi, the 3rd string is raised which produces the correct intervals though tuned a note higher. Rarely used is the Rokusagari (Lowered 6 Half steps) tuning which has the 1st and 3rd strings a perfect fourth apart and the 2nd and 3rd strings a major second with the 1st string sounding the Tonic.



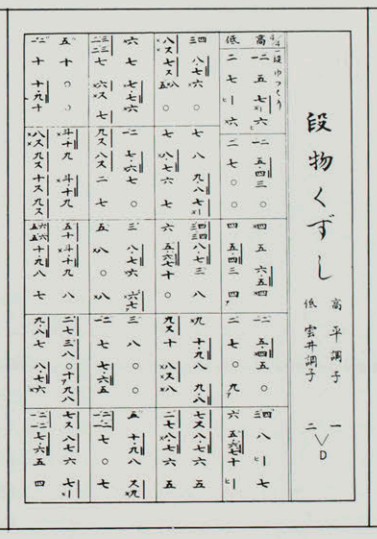
Shakuhachi score of the mid-19th century denoting melody. Read top to bottom, right to left.



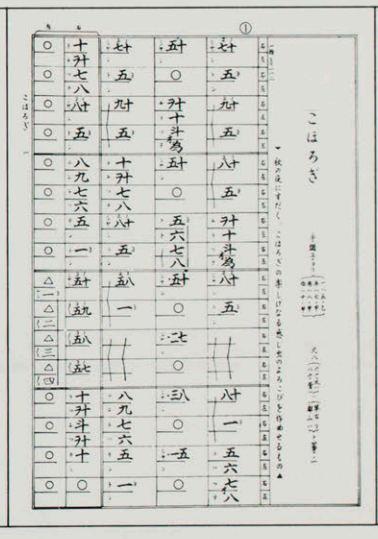
Shakuhachi score of the mid-19th century denoting tempo and rhythm. Read top to bottom, right to left.



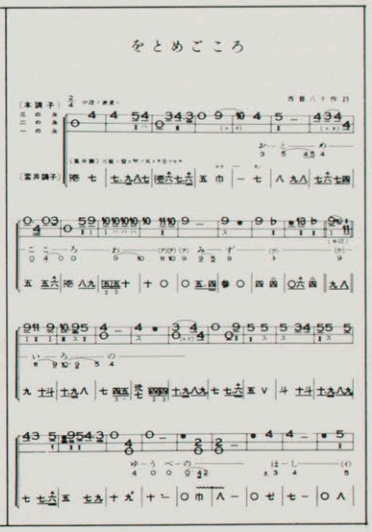
Modern koto music read from left to right.



Modern koto music read from top to bottom, right to left.



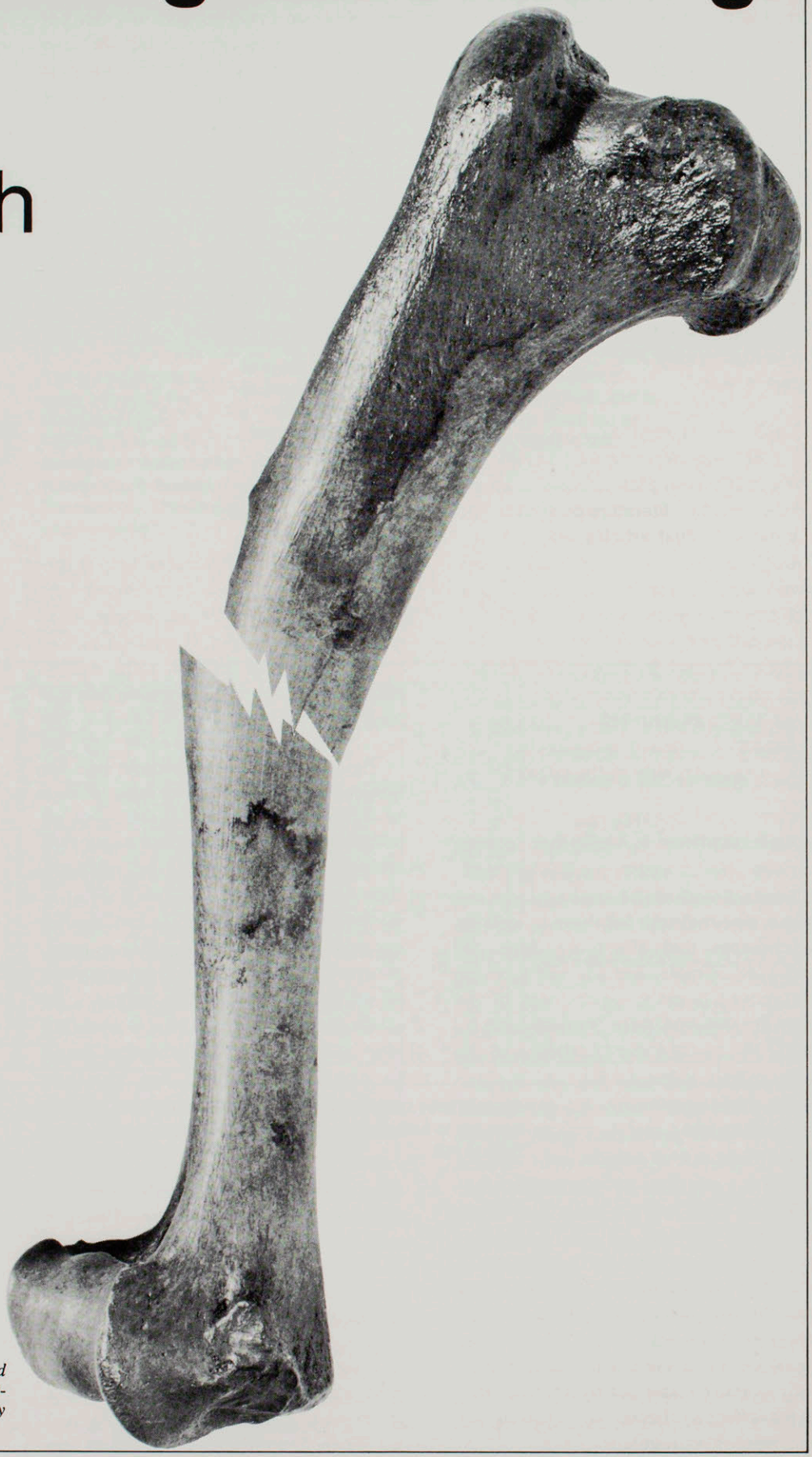
Music for koto (notation developed in late 19th century). Read from top to bottom and right to left.



Duet for koto and shamisen. Upper three lines correspond to the shamisen, the lower score for koto. Read from left to right.

Paleopathological Ponderings or How to Tell a Sick Saber-Tooth

by J. R. Macdonald
and
Gretchen Sibley*



**Gretchen Sibley and Reid Macdonald had so much fun doing "The Mummy, the Restroom and the Dinosaur" together that they decided to do another.*

In all the scores of popular books on paleontology and particularly such things as dinosaurs and the great Rancho La Brea fossil find, we don't recall ever seeing one on paleopathology or the branch of paleontology dealing with sick or injured prehistoric animals. Illness and injury is certainly a popular subject to judge from the array of paperback books available at the corner newsstand: "Surgery for the Housewife," "How to Raise your Baby to be a Hippie," "Secret Cures for ten Common Dread Diseases using Simple Garden Plants," "Swamp Water, Gin and Deep Breathing — the Secret of Good Health" are but a few of the things readily available to the interested layman.

Evidences of past diseases are often found in the preserved remains of ancient animals and even plants. There is an extensive scientific literature on such things but the individual articles are scattered through a large array of publications never seen by the general public. The last definitive work on the subject was "Paleopathology—an Introduction to the Study of Ancient Evidences of Disease" by Dr. Roy L. Moodie, published in 1923. Since that time our body of knowledge has grown a hundred-fold but there has been no general view of the subject.

Only those diseases leaving evidence of their existence in the bones or hard parts of plants and animals can be directly examined in the fossil record. This pretty well restricts the field to injuries or diseases that affect the bones or shells of animals. Paleopathology is of particular interest to us as many of the animals retrieved from the asphalt pits at Rancho La Brea show evidences of old injuries or disease. Evidences for parasitism and hypertrophy (the overgrowth of bone or shell resulting from an outside influence or a pathologic condition) are among the most ancient types of disease found in the fossil record beginning in Paleozoic times. At the end of the Palezoic during the Permian period, when the reptiles were beginning to take over the land areas of the world, we find fractured bones with the growth of callus (bone deposit around a fracture) and finally in the Triassic period the other diseases affecting bones are showing up with surprising regularity.

The record of broken limbs, ribs and occasionally skulls with untreated healing are fairly abundant in the fossil record. Ribs are the most common element showing breaking and healing with the development of callus. The mending of ribs without attention and special care would seem to be an ordinary natural occurence. The knitting of limbs without artifical immobilization is to us in our culture an extraordinary thing. Yet there are many examples from Rancho La Brea fauna of just such occurrences. Strangely enough it seems to be most common in wolves and birds. The mending of a broken leg on a bird can be readily visualized but the mending of a wolf's leg in the wild is an incredible occurrence, yet there are many examples of this in the Rancho La Brea fauna. Often the growth of callus is excessive and the break may be surrounded by a great mass of bony tissue.

The oldest recorded broken limb is the front leg of a permian "sail-lizard" or **dimetroden** from the Texas redbeds. This specimen at the Field Museum shows a complete fracture of the right radius which has healed without shortening the bone.

Dinosaurs were not exempted from the possibility of fractures in spite of their large size and massive bones. The legendary paleontologist Barnum Brown of the American Museum, who died several years ago, a few days short of his ninetieth birthday while preparing to go on another dinosaur hunt, found a dinosaur in the late Cretaceous beds of Canada with a badly fractured upper arm bone or humerus. Although united by callus this limb carried an abscess which may have eventually caused the animal's death. Fractures and repaired fractures are more common in fossil mammals but perhaps only because fossil mammals are more common than fossil reptiles. Many times the healing of such fractures will result in the formation of a new joint, often resembling a ball and socket joint in the limb or even the rib affected by the fracture.

Traumatic experiences may also involve stab wounds or dents in the skulls of animals. From the 25,000,000 year old White River Badlands in South Dakota the skull of a biting cat, **Nimravus bunpensis** was found with a saber wound in its forehead. The partially healed hole is just the right size for the saber of the early stabbing cat **Eusmilus.** If you are one of my group of heretics who believe the saber-tooths or stabbing cats were primarily carrion eaters, then the **Nimravus** and the **Eusmilus** must have gotten into an argument over a kill and the **Nimravus** made the mistake of sticking his head into the larger cat's mounth.

More years ago than I like to think about we collected a great mammoth skull from the excavation for a stock tank near Ipswich, South Dakota. The skull was preserved in mud and had been run over by a bulldozer many times before it was discovered. No piece of bone was bigger than the palm of your hand. I washed all the reasonable sized pieces in the sink and spread them out on a laboratory table. (The skull of an elephant is designed for the attachment of neck muscles to hold up the weight of the tusks and trunk. Most of it is like a great honeycomb. The brain sits in the middle surrounded by this great structure of fine thin bones — imagine the problems you might have if fifty percent of your headbone was made up of sinuses?). After borrowing all the spare ringstands and clamps from the chem department and conning all visitors to find "at least one fit" I finally got the skull assembled. The whole face and the occipital condyles were there, I only had to reconstruct the back of the cranium and the lower jaw. While the tusks were not mountable we did have measurements so they could be reproduced. At any rate, when the job was done we did have a beautiful exhibit piece **and** on the forehead was an inch-deep depression the size of a bread and butter plate with the center composed of callus. Ten thousand plus years ago somebody had clobbered our friend and bent his skull. Nature took its course and our animal lived to a ripe old age.

From the recently excavated late Pleistocene site at Maricopa we have the cranium of a great short-faced bear, one that makes the Kodiak look like a teddy-bear, who had his head beaten in when he was a cub. The cranium has grown all out of shape and one eye was useless but again nature has taken its course

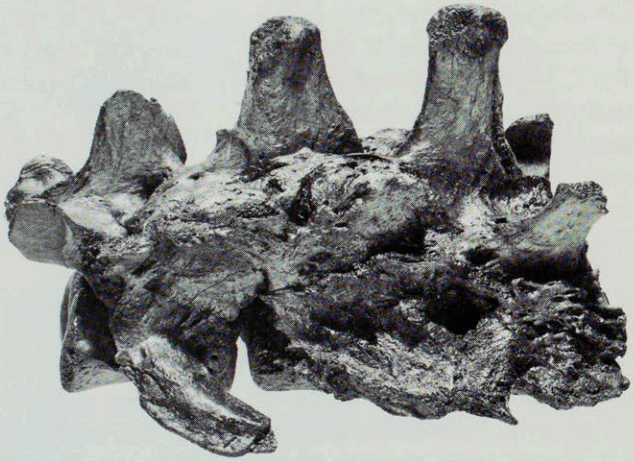
Fig. 1

Dire wolf rib with arrow indicating callus (protective bony tissue) deposited around an old fracture.

Fig. 6

Saber-tooth cat pelvis. A — Normal socket for left leg. Position arrow also indicates normal direction of leg bone. B — Abnormal socket for right leg. Position of arrow also indicates abnormal direction of leg bone which would have pointed the knee far out to the right of the body. The rough texture indicates infected bone.

Fig. 5



Saber-tooth cat vertebrae. Three separate bones fused by bony growth stimulated by infection.

and the growth of tissue has more or less made a normal skull out of it.

There are a multitude of bone diseases lumped under the name of arthritis. Moody reports this condition back in Cretaceous times in dinosaurs and mososaurs.

(Sibley)

During the past year I have examined hundreds of diseased bones from the pits at Hancock Park. And after a few weeks one begins to feel that either the pits were a gathering place for sick animals or a large percentage had some kind of skeletal abnormality. Percentages have not been calculated but certainly the three most prevalent pathological problems were broken bones, osteomyelitis (bone infection) and arthritis. We are using the word "pathology" in the larger sense to include any bone abnormality.

A good example of a simple fractured bone which healed itself is shown by the rib in figure 1. When a bone cracks and the parts do not separate, additional bony tissue develops to strengthen the bone. Anyone who has suffered a broken rib can feel the bump (callus) which forms at the fracture.

Some of these poor animals suffered a much more severe break which caused death since such problems as crippling, infection and bleeding were beyond repair. However, a few individuals managed to survive for many years. The upper left hind leg bone of a dire wolf (fig. 2) shows a serious break and infection. The two parts of the bone separated, the broken ends lodged side by side, bony tissue formed around them and a new and continuous marrow cavity formed. Infection was present and the wolf no doubt suffered great pain but continued to live for a number of years with a usable hind leg.

The bones of cats and dogs frequently show osteomyelitis. Since these animals are inclined to fight, many deep claw and tooth wounds became infected carrying disease into the bone. One good example is shown in the upper left front leg bone of a dire wolf (fig. 3). The bone shows no evidence of a break, but is shortened, thickened and perforated by large holes caused by pockets of suppurating infection. The well-developed bone indicated that the wolf stumbled along for many years with his crippled leg.

Another old fellow spent much of his life limping on a foot with bones shortened, fused and twisted by infection (fig. 4).

Fused vertebrae were unusually common among the saber-tooth cats and this too was caused by infected injuries. Diseased bone grew around the processes of the vertebra. It is not unusual to find three or four vertabrae fused with a considerable mass of additional bone such as found in fig. 5. Both pain and impaired movement might have drawn these huge cats to the pits to feed on the dying animals trapped in the asphalt.

One large cat developed a particularly bad infection which he carried most of his life. The infection started on the right side of his pelvis (fig. 6), completely disfiguring the bone. A new socket at an odd angle was formed by the head of the leg bone grinding into the soft, infected bone. In time the infection covered most of the pelvis causing great pain and probably a bad-tempered member of the cat society near the pits.

Other pathological conditions found include arthritis, a bony growth along the edges of joints; evidences of tumors along nerves or blood vessels causing accommodating sinuses in the bone; spurs along areas of muscle attachment; abnormal blood vessels and muscle calcification.

Does any of this sound familiar? Many people share these conditions and pains evidenced in fossil material; and even if we escape most of the pathology, few of us reach many years without a twinge of arthritis.

In this day of medical miracles we have no difficulty in identifying a sick saber-tooth, though the identification of the cause of a pathological condition is often difficult to determine.

Fig. 4

A

B

Dire wolf foot bones
A — Normal foot.
B — Abnormal bones shortened and fused by infection.

Fig. 2

Upper hind leg bone
from a dire wolf.
A — Abnormal bone:
broken, parts of
the bone separated
and surrounded
by strengthening bony
growth.

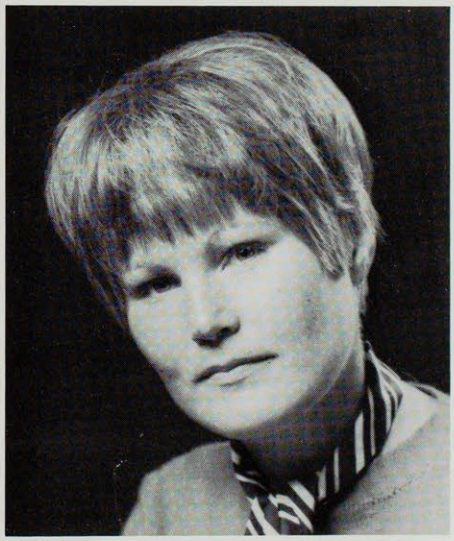
Fig. 3

Upper front leg bones
from a dire wolf
A — Abnormal bone:
shortened, thickened and
perforated by
suppurating infection.
B — Normal bone.

MUSEUM SPOTLIGHT

Three New Staff Members for the Division of Education

Ed Green, Dixie P. Myers and Peggy Nielson have recently been added to the staff of the Division of Education.



Peggy Nielson

Peggy Nielson, preparator, replaces Mr. Ken Good who retired in May. Miss Nielson was born and raised in Santa Monica where she graduated from Santa Monica City College as an honor student. She has recently graduated from U.C.L.A. with a B.A. in design, and is now working towards an M.A. in art history. She has also worked as a teaching assistant at both S.M.C.C. and U.C.L.A.

Dixie P. Myers

Dixie P. Myers, educational advisor in charge of the lending service, replaces Mrs. Dorothy Weatherhead who retired in April.

Mrs. Myers graduated with honors from Long Beach State College where she majored in radio and television. While in college she was employed as a production assistant and teacher's assistant. As a part of her college work she produced a series of twelve half-hour Greek dramas for radio and produced and directed three television dramas.

For the past few years she has been the public service director at KOCM-FM, Newport Beach.

Mrs. Myers' husband, Don, is in configuration management at Collins Radio. Mr. and Mrs. Myers have one daughter, Diane, a high school sophomore.

Ed Green

Ed Green, education specialist in communication, has taken the position vacated when Richard Lipscomb was appointed chief of the division. Mr. Green served in the Marine Corps on Guam and Iwo Jima during World War II. Following the war he attended Carnegie Institute of Technology where he graduated with a major in drama. For the following ten years he worked in legitimate theatre as an actor, producer and reporter in New York, Houston, Pittsburgh, Cleveland and Cape Cod. Later he worked for several years as assistant advertising manager for Eastern Airlines and spent the last six years as Publications Editor for Transcon Lines.

He is active with the Carnegie-Mellon drama alumni of the west coast and serves on the board of directors.

Mr. Green and his wife Lorna live in San Fernando Valley with their three children, Edward 14, Jamie 12 and Lynn, 2 months.

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